IN THE CLAIMS

1. (currently amended)

A method of monitoring turbine engines ~~such as those used in aircraft~~, comprising the steps of:

obtaining sensor signals from an engine for a predetermined set of engine characteristics;

transmitting said signals to a nonlinear engine model having predicted values for said predetermined set of engine characteristics and generating residuals by calculating the difference between the ~~actual values~~ obtained sensor signals and the predicted values for each member of said set;

statistically analyzing the generated residuals of each set to estimate bounds of uncertainties as indicative of sensor noise;

comparing incoming residuals from ongoing actual engine values against said bounds and signaling a fault for each of said set of characteristics when a detected bound is exceeded;

calculating ~~the~~ a fault residual for each of said set of characteristics and selecting the ~~closest~~ fault residual closest to said bounds of uncertainties as a diagnosed fault.

2. (original)

The method of claim 1, wherein said model divides said predetermined sets of characteristics into static modules and dynamic modules.

3. (original)

The method of claim 2, wherein said static modules represents major rotating components by maps.

4. (original)

The method of claim 3, wherein said static modules calculate power, enthalpy and temperatures for each component.

5. (original)

The method of claim 2, wherein said dynamic modules determine inter-component pressures by flow balance.

6. (original)

The method of claim 5, wherein said dynamic modules calculate spool speeds from a power balance.

7. (currently amended)

A system for monitoring ~~turbineengines~~ turbine engines ~~such as those used in aircraft~~, comprising:

sensors for obtaining sensor signals from an engine for a predetermined set of engine characteristics;

a nonlinear engine model adapted to receive said sensor signals, said model having predicted values for said predetermined set of engine characteristics and adapted to generate residuals by calculating the difference between the ~~actual values~~ obtained sensor signals and the predicted values for each member of said set;

said model further being adapted to statistically analyze the generated residuals of each set to estimate bounds of uncertainties as indicative of sensor noise;

said model including a comparator for comparing incoming residuals from ongoing actual engine values against said bounds and signaling a fault for each of said set of characteristics when a detected bound is exceeded; and

said model including a calculator for calculating ~~the~~ a fault residual for each of said set of characteristics and selecting the ~~closest~~ fault residual closest to said bounds of uncertainties as a diagnosed fault.

8. (original)

The system of claim 7, wherein said model divides said predetermined sets of characteristics into static modules and dynamic modules.

9. (original)

The system of claim 8, wherein said static modules represents major rotating components by maps.

10. (original)

The system of claim 9, wherein said static modules calculate power, enthalpy and temperatures for each component.

11. (original)

The system of claim 8, wherein said dynamic modules determine inter-component pressures by flow balance.

12. (original)

The system of claim 11, wherein said dynamic modules calculate spool speeds from a power balance.

13. (currently amended)

A system for monitoring turbine engines ~~such as those used in aircraft~~, comprising:

sensor means for obtaining sensor signals from an engine for a predetermined set of engine characteristics;

a nonlinear engine model means for receiving said sensor signals, said model having predicted values for said predetermined set of engine characteristics and adapted to

generate residuals by calculating the difference between the ~~actual values~~ obtained sensor signals and the predicted values for each member of said set;

said model means further being adapted to statistically analyze the generated residuals of each set to estimate bounds of uncertainties as indicative of sensor noise;

said model means including a comparator for comparing incoming residuals from ongoing actual engine values against said bounds and signaling a fault for each of said set of characteristics when a detected bound is exceeded; and

said model means also including a calculator means for calculating ~~the~~ a fault residual for each of said set of characteristics and selecting the ~~closest~~ fault residual closest to said bounds of uncertainties as a diagnosed fault.

14. (original)

The system of claim 13, wherein said model means divides said predetermined sets of characteristics into static modules and dynamic modules.

15. (original)

The system of claim 14, wherein said static modules represents major rotating components by maps.

16. (original)

The system of claim 15, wherein said static modules calculate power, enthalpy and temperatures for each component.

17. (original)

The system of claim 14, wherein said dynamic modules determine inter-component pressures by flow balance.

18. (original)

The system of claim 17, wherein said dynamic modules calculate spool speeds from a power balance.